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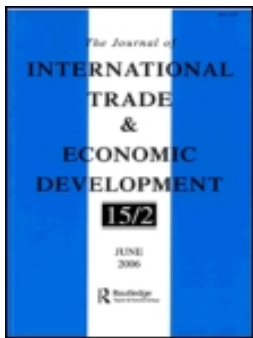
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Structural change in OECD comparative advantage

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In the post-war period, the goods composition of trade in Organisation for Economic Cooperation and Development (OECD) countries has changed considerably. We analyze the evolution of comparative advantage using a detailed trade data set and a new analytical tool: the Harmonic Mass index (HM index), which enables us to identify periods of structural change. We then discuss which forces may be responsible for the main structural changes, which primarily took place in many OECD countries in the mid 1980s. The advantage of the HM analysis is that it indicates when structural breaks occur in history.

Keywords: Balassa-index; structural change; comparative advantage

JEL Classifications: F14, O5

1. Introduction

It is a well-known fact that countries pass through phases of economic development (Rostow 1960). The traditional idea is that countries move from producing primary products, to manufacturing goods, and finally to service activities. Associated with this broad categorization is the level of development of certain countries, where developing countries are associated with primary products and developed countries with manufacturing or service activities. These stages of development are reflected in trade patterns. More formally, Brezis, Krugman, and Tsiddon (1993, 1211) show that ‘long periods of economic and technological leadership... are not forever’ and that technological growth finally results in a situation where (ibid, 1217) ‘... there must be an abrupt reversal of the trade pattern’. This formalization shows that changes in trade patterns point towards structural economic changes in the economies involved.

Trade theorists and empiricists, however, modify these descriptions in the sense that countries specialize according to comparative advantage,

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which is not necessarily associated with stages of economic development [see Feenstra (2004) for a survey of the results and Kali, Mendez, and Reyes (2007) for recent work]. The Netherlands, e.g. is strong in agriculture, but still a developed country (agricultural production is both capital intensive and skill intensive in this country). Furthermore, in practice the trade pattern might be undetermined in a world with more goods than factors of production (Bernstein and Weinstein 2002). Despite these objections, factor endowments, by and large, seem to determine trade patterns (Davis and Weinstein 2001). This also holds in a dynamic context (Grossman and Helpman 1991, Ch.7; Redding 2002).

We focus on the structural changes in trade patterns. Although this article does not have an all-embracing theme of stages of economic development, it tries to identify new economic patterns by identifying structural changes in trade patterns. These breaks might be a manifestation of structural breaks in the global division of labour. In this sense, trade patterns can be used to reveal encompassing structural economic breaks in the world economy.

The contribution of this article is two-fold. First, we use a new method for identifying structural breaks in large data sets, the so-called Harmonic Mass Index (HM-index, see Hinloopen and van Marrewijk 2005), and apply this method to a detailed analysis of trade patterns in Organisation for Economic Cooperation and Development (OECD) countries. We describe trade patterns by analyzing revealed comparative advantage, using the Balassa index. Second, we can time the structural breaks. Our analysis indicates that the 1980s was a period of fundamental change for OECD countries. That is, most structural changes took place in this period. In view of similar recent large swings, we argue that it is likely that the OECD countries will again go through substantial structural adjustments in the near future.

The article is structured as follows. Section 2 briefly reviews standard methods of structural breaks and highlights that what the value added is of our method. Section 3 gives a detailed account of the development of comparative advantage in OECD countries. We show that structural breaks are present, particularly in the 1980s. Section 4 speculates on some of the possible causes of the structural breaks. Finally, Section 5 concludes.

2. Identifying structural breaks in large data-sets

Hansen (2001) surveys the standard approaches of identifying structural breaks. According to him, a structural break in essence is a change in the parameters α or ρ at some date in the following (most simple) dynamic model:

$$y_t = \alpha + \rho y_{t-1} + e_t \quad (1)$$

where y is a time series and e_t the error term.

The parameter α controls the mean, and ρ the serial correlation in y . One can revert to standard tests to identify structural breaks, or test a random walk against a time trend (see f.i. Andrews 1993). A disadvantage of this time series model is that in many applications we do not have specific information on the underlying model that generated the data, as shown in equation (1), and that a structural break is related to a time series of a single variable. However, in some cases one is interested in the evolution of an entire distribution, instead of just a time series of a single element within this distribution. The analysis of an entire distribution is the main focus of this article. The reason that analyses based on equation (1) are not satisfactory in our case is that comparative advantage changes are not about a change of the trade (export/import) status of a single commodity over time, but about the change in the trade status of that commodity versus all other commodities. This is the fundamental lesson from Ricardo. Changes in the relative (comparative) position of all commodities versus one another imply that changes of the whole distribution must be analysed. In those cases, one can rely on non-parametric methods, such as kernel estimates or Markov transition matrices. The disadvantage of the former is that differences between histograms are hard to interpret or to evaluate statistically,¹ and the disadvantage of the latter is that the data have to be divided into, ad hoc, grid cells (Redding 2002).² The method we apply here is the HM index developed by Hinloopen and van Marrewijk (2005).³ The essence of this method is that the characteristic of the comparison of the entire distribution is translated into a number between 0 and 1, based on Probability–Probability (PP) Plots; see Figure 1 for a graphical illustration.

Let $F_1(x)$ and $F_2(x)$ represent two distribution functions. By definition, a distribution function indicates the probability that a random variable takes on a value smaller than x . Comparing two distributions only involves comparing the probability related to a certain value x in one distribution with the probability of that x in the other distribution. More formally, $p_2 = F_2(F_1^{-1}(p_1))$, and if this results in $p_1 = p_2$ throughout the domain, the two distributions are identical. In Figure 1, panel *a* plots a theoretical PP-plot for two distributions that are not identical. If they would be identical, this plot would coincide with the 45° line. The HM-index calculates the area between the PP-plot of the actual distributions and the 45°-line.

$$HM(F_1, F_2) = 2 \int_0^1 |p - F_1(F_2^{-1}(p))| dp \quad (2)$$

As the maximum value of the deviation of a PP-plot with the diagonal is reached when the curve never crosses, the maximum surface area between the two lines is $\frac{1}{2}$; this is why the surface in equation (2) is multiplied by 2 in

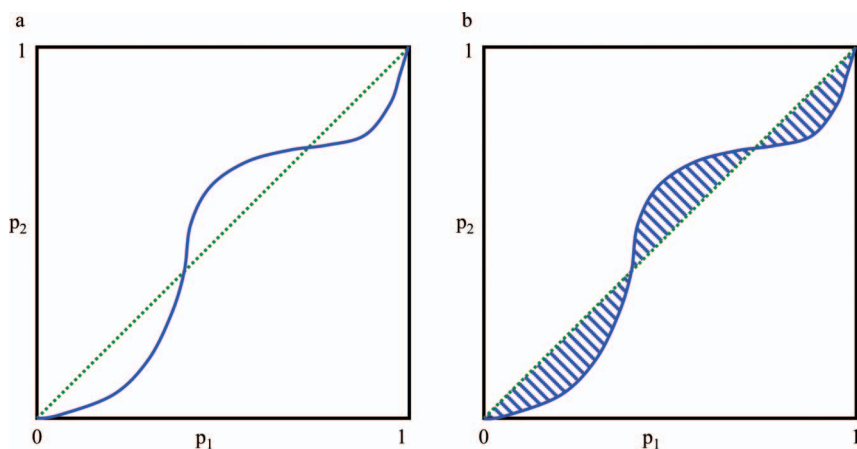


Figure 1. Theoretical PP-plot (panel a) and the associated HM-index (panel b).

order to normalize the HM-index to a value between 0 and 1. The HM-index has many attractive properties for applied research: it is not susceptible to outliers in the data, is scale-invariant and, last but not least, there is no need for discrete approximations, e.g. in applications using Markov transition matrices. Moreover, Hinloopen and van Marrewijk (2005) analytically derive exact, finite-sample critical values for the HM-index, which makes it more attractive than (variants) of kernel estimates.

3. Revealed comparative advantage

The next step is to interpret HM-index values. In this article, we apply the method described in Section 2 to the analysis of structural – international trade – changes. We analyze the so-called Balassa Index (BI), which indicates the extent of a country's revealed comparative advantage in a certain sector:

$$BI_s^c = \frac{\text{export}_s^c / \text{export}^c}{\text{export}_s^{\text{ref}} / \text{export}^{\text{ref}}} \quad (3)$$

Equation (3) defines the BI for country c in sector s , where ref indicates the group of reference countries. If the BI exceeds unity, the country is said to have a revealed comparative advantage in that sector; this occurs if the share of sector s in the total exports of country c is larger than the share of that sector in the exports of the group of reference countries ($BI_s^c > 1$).⁴ If the BIs change over time, the structure of international trade changes over time. We calculate BIs for the period 1962–2000, for 3-digit Standard Industrial Trade Classification (SITC) commodities (in total 235 sectors) for

21 OECD countries, taking the overall OECD as the reference group.⁵ The data are described in Feenstra et al. (2005). Two different types of comparison come to mind; first comparing country pairs, second comparing observations over time for the country itself.⁶ The first comparison is useful to determine if *countries* differ in their distribution at a point in time. The second comparison is useful for analyzing *structural changes* in the distribution over time *within* a country. We focus on the second application below, but we first provide some evidence on the between-country differences.

3.1. Between country BI distribution comparisons

As there are 21 countries in our data set, we can construct $21 \times 20/2 = 210$ bilateral BI distribution comparisons at any point in time. Figure 2 summarizes our findings for these comparisons by illustrating the share of these comparisons that is deemed statistically significantly different using the HM index at various significance levels. Evidently, at any point in time, almost all bilateral comparisons conclude that the BI distribution is different for any pair of countries (varying from around 70–90% of the cases at the 1–10% level of significance). Over the 39-year period, only one bilateral BI distribution comparison, namely that of Denmark and Italy, never exceeds the 10% critical significance level.⁷ Usually, we must conclude that the distributions differ significantly between countries, indicating that any cross-country comparison of BI values must be treated with extreme caution. This

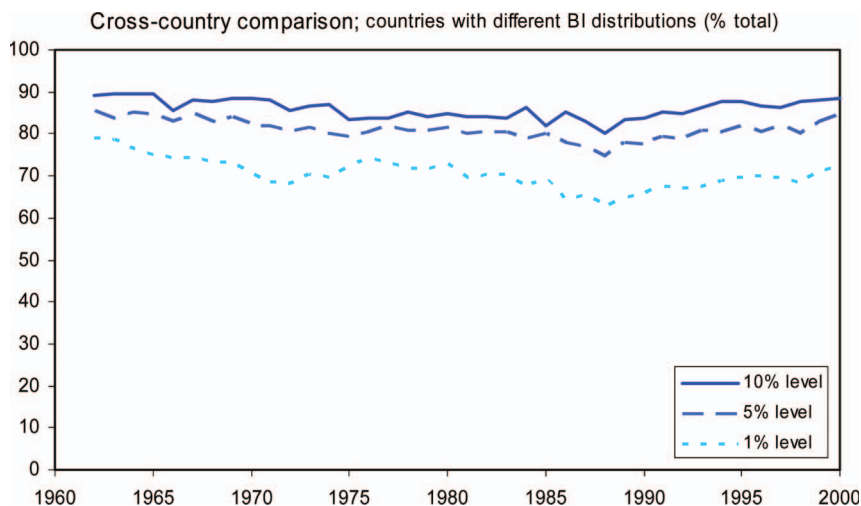


Figure 2. BI distribution differs significantly between countries. The lines plot the percentage of 210 HM indices exceeding the respective critical value in that year.

implies that the various Balassa indices cannot easily be compared between different countries. To enable such a comparison, it is necessary to provide a characterization of the distribution based on country- and/or sector-specific economic information. A first contribution in this respect, regarding the tail-index of the BI distribution, is provided by Hinloopen and van Marrewijk (forthcoming).

3.2. Within country BI distribution comparisons

The application of the HM methodology is relatively straightforward. We start for a particular country in 1962, and compare the distribution of the BIs in 1962 with the distribution of the BIs for 1963. This results in a number for the HM index for this comparison. Given the critical value, we can conclude whether or not the distributions are statistically significantly different.⁸ Next we compare the 1962 distribution with 1964, etc. until 2000. Then we move on to 1963 and repeat the exercise until the last year of observation (the year 2000). This procedure is repeated until we finally compare 1999 with 2000. To summarize this large number of comparison for each country, we focus first on comparing the current distribution with the distribution 5 years in the future, and ask whether in that final year the distribution is significantly different. Since the distributions can be volatile in individual years, we use a 5-year moving average.

Figure 3 shows in which years OECD countries showed their most notable change in comparative advantage. For example, the figure shows that Finland and New Zealand experienced this peak in 1969. This means that the pattern of comparative advantage in these countries in the 5-year period centred around 1969 was substantially different from the pattern in the 5-year period centred around 1964. The key observation from this figure is that most structural changes occurred in the 1980s, with 17 of the 21 countries showing the largest change in trade pattern in that decade.

This finding is not a result of comparing periods that are 5 years apart or focusing on the peak years in the HM index. Figure 4 shows that the 1980s were a period of exceptional structural change, regardless of these choices. First, this figure shows the number of all statistically significant breaks in a year. Second, it shows the significant breaks for 1–5-year differences rather than only peaks and only 5-year differences. The main observation from this figure is that most structural change occurred in the 1980s, in particular in the second half. In other words, compared to the early 1980s and earlier years, trade patterns were very different in the mid to late 1980s. This main finding does not rely on any particular way in which we analyze the HM indices. In the Appendix 1, we provide further robustness analysis. As was to be expected, the extent to which the trade pattern (distribution of Balassa indices) differs between years rises as the number of years in between rises.

Even though structural change is concentrated in the 1980s, Figure 4 also shows that not all structural changes occurred then. Moreover, some OECD countries experienced very little change, while others showed frequent and

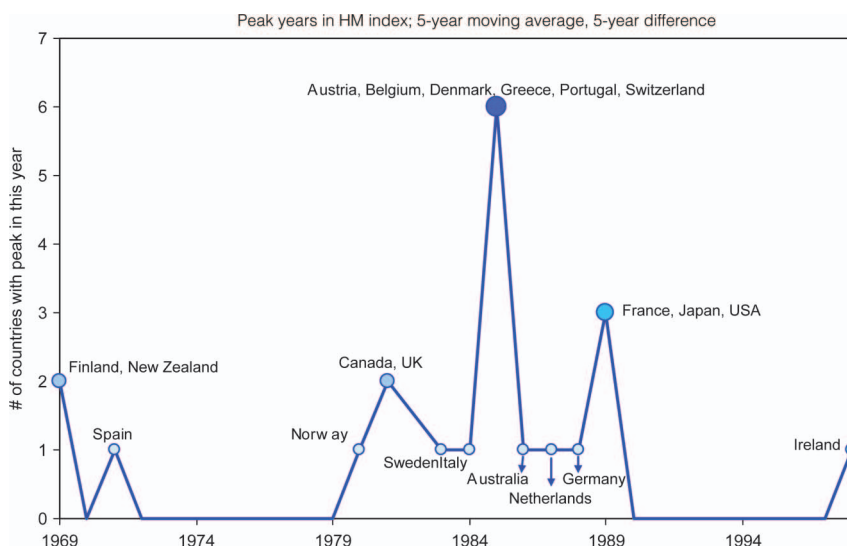


Figure 3. Peak years in HM index; 5-year moving average, 5-year difference. The reported difference is backward in time (the peak in 1984 indicates changes from 1979 to 1984).

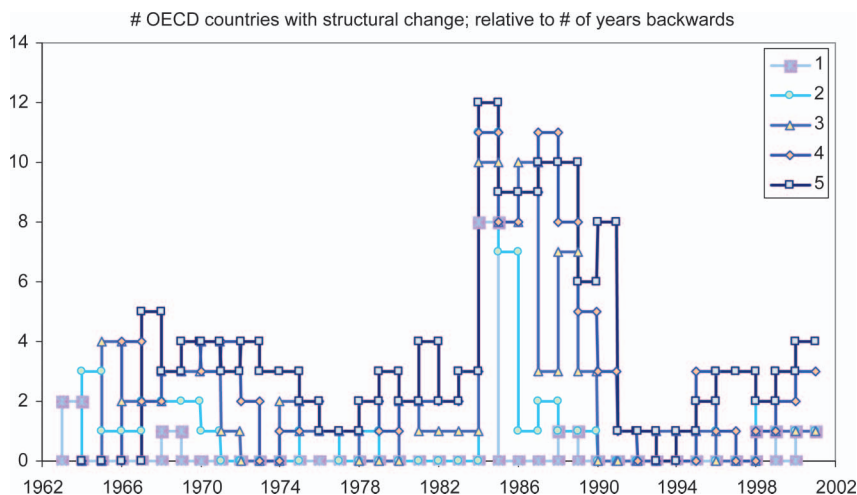


Figure 4. Number of OECD countries with structural change. Significance at 10% level.

substantial changes. Table 1 summarizes this information, first by grouping countries according to the number of peaks in their HM index and second by evaluating the intensity of change. Figure 5 illustrates for a number of countries how we grouped the countries by the intensity of change. Although this grouping is necessarily arbitrary, we feel that it provides a useful summary of the information. As the table shows, nearly all countries had one or more peaks in their HM index. Large countries, like Germany and the US, tend to show fewer episodes of structural change and structural change tends to be less intensive, a result that might be expected. In fact, of the G7 countries, only the UK shows a medium-high intensive change.

4. Speculation on possible causes

We have seen drastic structural change taking place in the 1980s. This begs the question what could have caused these changes. It is beyond the scope of this article to give a full-fledged analysis of possible reasons for these changes as each of them requires a dedicated analysis, but some possibilities stand out. Note that our search for 'causes' focuses upon phenomena that coincide temporally with the break, which is not strictly necessary to find a cause for the break.

This section is therefore more aimed to evaluate the *a priori* likelihood of a particular development to lead to the structural changes described. As the structural changes identified here relate to the whole distribution of the BI, the causes should be economy wide. This section discusses three possible economy wide causes for the peak in structural changes in the 1980s, namely: (i) competition from low-wage countries, (ii) deregulation in

Table 1. Structural change: intensity and peaks.

Character of evolution HM index	Intensity of structural change			
	Low	Low-medium	Medium-high	High
None-stable	Sweden, Switzerland			
Single-peak		Germany, Italy, USA	Austria, Belgium, Norway	Greece
Double-peak		Canada, Denmark, France, Japan	Australia, The Netherlands, UK	Finland, New Zealand
Triple-peak				Ireland, Portugal, Spain

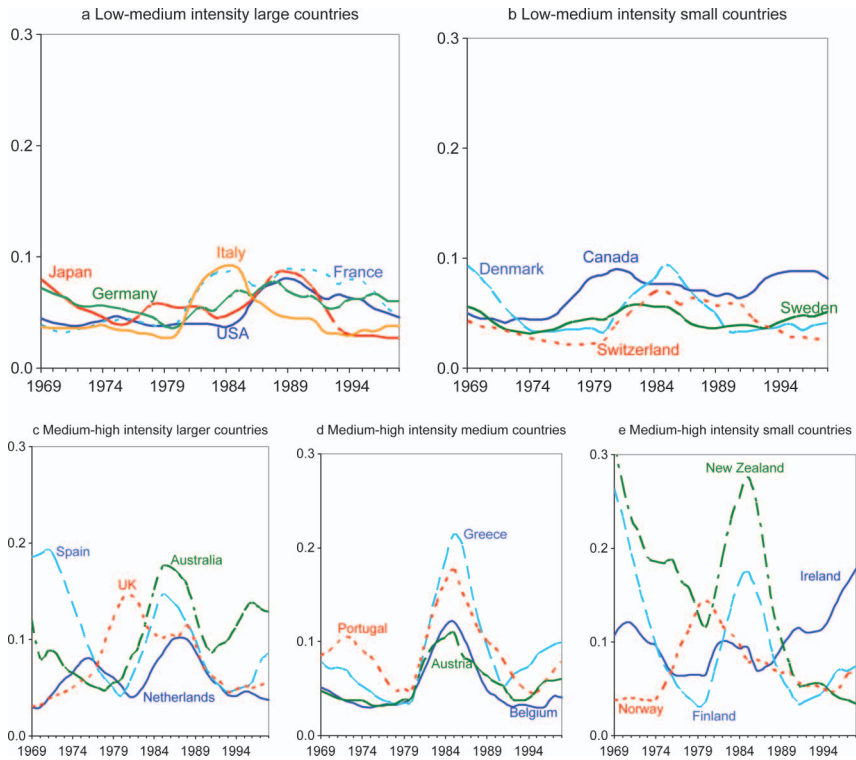


Figure 5. 5-year centred moving average of HM index. The reported difference is backward in time, the moving average is centred in the middle.

OECD countries and (iii) nominal–real interactions through exchange rate movements.

4.1. Competition from low-wage countries

A natural candidate to explain these shifts is an application of the Dornbusch, Fischer, and Samuelson (1977) model. The model has two attractive properties: (i) it does not assume factor price equalization (FPE) and (ii) it allows for a greater number of products than factors of production. If FPE does not hold, the pattern of trade is determined. The model can easily be summarized by Figure 6. Along the horizontal axis, we have a variable z that indicates the range of goods by increasing order of capital or skill intensity, the index is normalized between 0 and 1. The C and C^* are unit cost functions for Home and Foreign, which are functions of factor prices and z . If we assume that Foreign is relatively skill abundant, the slope of C is larger than C^* (skill intensive products become more

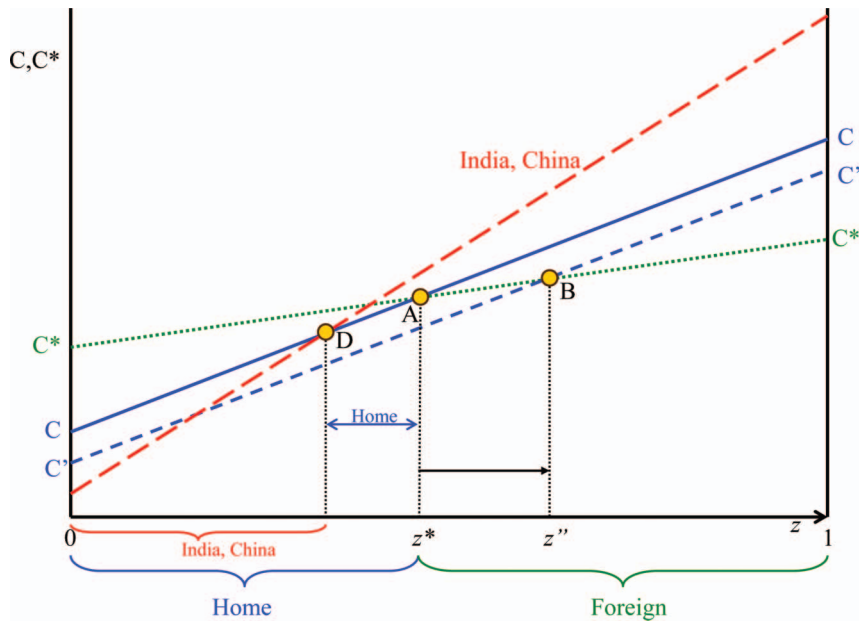


Figure 6. A model of a continuum of goods.

expensive in ‘skill-poor’ Home). The restrictions on the cost functions are limited (they do not even have to be continuous), but we assume them to be well-behaved, as is shown in Figure 6. Concentrate on the CC , and C^*C^* lines. Home is relatively unskilled-labor abundant and has lower unit costs in commodities that make intensive use of unskilled production factors. As products become more skill-intensive, the cost advantage of Home is lost and Foreign becomes a producer and exporter of goods that have a higher index than z^* – which is determined by the intersection point A .

In a dynamic world, all kinds of economic changes can happen and two of these are illustrated in Figure 6. First, caused by changes in factor prices, the unit cost curves can shift up or downwards. Figure 6 illustrates a downward shift of the cost curve CC to $C'C'$. Due to cost decreases, the range of commodities that can be competitively supplied increases for Home, as indicated by z'' . Another possibility is an additional competitor on the world market, as indicated by the dashed line ‘India, China’. New entrants into the world market with different factor prices than incumbent trading partners might capture a part of world exports. As illustrated, unskilled intensive sectors are captured by the new entrants (up to the point D) at the expense of Home production. Obviously, the exact combination of shifts determines changing trade patterns. Note that, in contrast to Dornbusch, Fischer, and Samuelson (1977), our analysis is based

on a partial equilibrium model. The appearance of a 'new' competitor on the world market is likely to affect factor prices of incumbents. In this case, a simultaneous downward shift of CC to $C'C'$ is likely, which dampens the competitive effects of new entrants for Home (extending its range from ' $D-A$ ' to ' $D-B$ '), thus also affecting the range of goods produced by Foreign.

Figure 7 provides an aggregate indicator for the degree of structural change in all countries by reporting the (centered) 3- and 5-year moving average of the 5-year difference HM indices. The peak in the 1980s is clear, as are the slight increases at the beginning and the end of the time frame in the figure. Figure 7 also illustrates why we do not think the 'competition from low-wage countries' theory is very convincing as the main initiator of structural change in the 1980s by indicating the share of world trade for four countries, namely China and India as by far the largest upcoming low-wage competition countries, and Belgium and the Netherlands as two small countries nobody evidently thinks of to be substantial enough to cause large structural changes in other countries. In 1982, China exported 1.07% of the world total and India 0.55%. This is substantially smaller than the exports of both Belgium (2.67%) and the Netherlands (3.71%). Indeed, the combined exports of India and China were smaller than Belgian exports until 1996 and smaller than Dutch exports until 1997, while Chinese exports succeeded Dutch exports for the first time in the new millennium. The trade

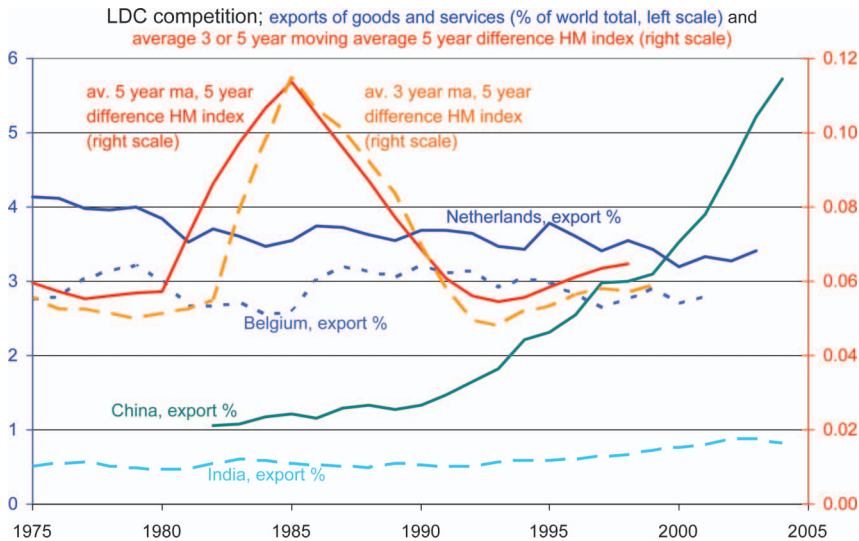


Figure 7. Structural change and competition from low-wage countries. The reported difference is backward in time, the moving average is centred in the middle. The export percentages (goods and services) are calculated based on data from the World Development Indicators.

flows from China and India in the 1980s and 1990s are simply not substantial enough to be the main economic driver for structural change in the OECD countries.

4.2. Deregulation in OECD countries

Following the second oil crisis in 1979/1980, industrial countries faced one of the deepest recessions in the post-World War II period. Some governments reacted by a more favourable attitude towards market mechanisms, while others avoided implementing market-oriented policies. In general, market competition was stimulated in the OECD economies starting in the 1980s, as Nicoletti and Scarpetta (2003) and Conway and Nicoletti (2006) extensively document. Given the extent of these deregulation policies, it might be expected that the sector composition of OECD exports is affected by these deregulations, which also have a bearing on international trade flows. However, we think that these system-wide changes cannot be the main explanation for our findings.

Although the deregulation reforms were OECD-wide, the pace at which the deregulation policies were or are implemented, the extent of the policies, and the industries that were targeted differ markedly between OECD countries. Nicoletti and Scarpetta (2003) find that increased competition, indeed, favours productivity increases and possible changes in comparative advantage, reducing, e.g. the share of state-controlled firms and stimulating productivity. However, in Finland, Greece, Austria, France and Italy, a relatively large share of sectors is still publicly controlled, which negatively affects productivity increases. Also a reduction in entry barriers positively affects productivity. In Portugal, Greece and Italy, a reduction in these entry barriers boosted productivity by 0.2% points. The same holds for the removal of administrative barriers in Germany, France, Italy and Greece, which also boosted productivity by 0.2%. Although reforms in some countries started during the supply-side revolution in the 1980s (e.g. Thatcher in the UK), it is difficult to pin-point an exact date for the effects of these reforms to take place, notably as some of the reforms were initiated much later (think of the European Single Market program since 1992) and continue up to this date. Furthermore, as shown by Bernard, Redding, and Schott (2009), trade liberalization is more likely to affect the (export) product characteristics of firms than average total exports.

4.3. Nominal-real interaction and the exchange rate⁹

The *real* (bilateral) exchange rate between two countries *A* and *B*, say q_t , is the difference between the nominal exchange rate and the price indices of the two countries: $q_t \equiv s_t - (p_{B,t} - p_{A,t})$. This real exchange rate provides a measure of the deviation from purchasing power parity (PPP) between the

two countries. As such, the real bilateral exchange rate is a measure of the evolution of one country's competitiveness (broadly measured) relative to another country. The real *effective* exchange rate calculates a weighted average of the bilateral real exchange rates. It plays an important role in policy analysis as an indicator of the competitiveness of domestic relative to foreign goods and the demand for domestic and foreign currency assets. As the real effective exchange rate is an index, the focus is on changes of the index relative to some base year, that is the policy focus is on relative and not absolute PPP.

The fall of the Shah of Iran in 1979 initiated a second oil shock, with prices rising rapidly from \$13 to \$32 per barrel.¹⁰ This led to high inflation rates and a sharp recession with high unemployment rates in the oil importing countries, including the US. In October 1979, Paul Volcker, Chairman of the Federal Reserve, announced a tightening of monetary policy to fight inflation. Ronald Reagan was elected president in November 1980 and kept his promise to lower taxes starting in 1981 (he also promised to balance the budget, but that is another matter). The combined effects of the tight monetary policy, high interest rates and the fiscal expansion started to drive the value of the US dollar up on the foreign exchange markets from 1981 onwards (see Figure 8). The appreciation of the dollar made it easier to fight inflation, so monetary policy could be relaxed. Together with the continued fiscal expansion, the American economy started to grow rapidly and unemployment fell, which in turn led to a further appreciation of the dollar. Eventually, the dollar would reach its maximum real value in

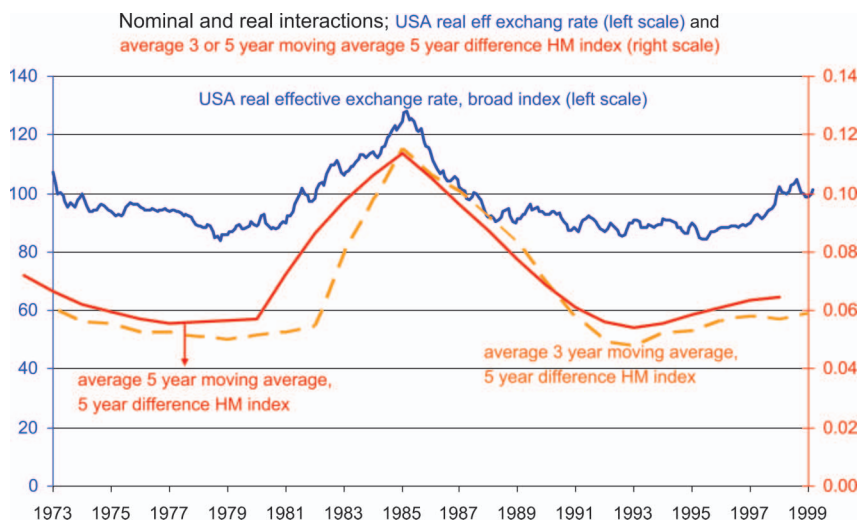


Figure 8. Nominal-real interactions and structural change.

February 1985, about 46% higher than it had been in June 1980. In the course of 1985, it was clear that the dollar was overvalued, which contributed to the American economic slow down which had started in 1984 and to mounting protectionist pressure in America. On 22 September 1985, the Reagan Administration no longer ignored this link between the strong dollar and mounting protectionism and announced at a meeting in the Plaza Hotel in New York that the group of five (G-5 = USA, Japan, Germany, Britain and France) countries would jointly intervene in the foreign exchange market to reduce the value of the dollar. This led to a sharp fall the next day, which continued for about one and a half years until February 1987 when the real value of the dollar had reached a level about 30% below its peak level of two years earlier. In a new meeting at the Louvre in Paris, the G-5 declared that the dollar was 'broadly consistent with underlying economic fundamentals'. For a while, there was an implicit agreement to intervene in the foreign exchange market if the dollar would move outside of a band of plus or minus $\pm 5\%$ of certain parity rates relative to Germany and Japan. This period ended with the US stock market crash in October 1987, driving the real value of the dollar down until it reached a level in March 1988 about similar to the level it had been in December 1980.

Figure 8 illustrates both the rise and fall in the real value of the American dollar and the virtually coinciding peak in structural adjustments in the OECD countries. Note that the real value of the dollar is also high at the beginning and the end of the period in Figure 8, again coinciding with higher structural adjustments in these periods. Supporting the view that fluctuation in the real exchange rate, caused by nominal rigidities and delays in exchange rate pass through, is the main candidate for the peak in structural adjustments, is the fact that different types of sectors are hurting or benefiting in different countries, see Brakman, Inklaar and van Marrewijk (2010).¹¹ In view of the large swings in the real value of the dollar in the past couple of years, it is to be expected on the basis of this discussion that many sectors in the OECD countries are currently again going through substantial structural change.

5. Conclusion

In the post-war period, the goods composition of trade in OECD countries has changed considerably. We analyze the evolution of comparative advantage using a detailed trade data set and a new analytical tool: the HM index, which enables us to identify periods of structural change even when they unfold. The 1980s stand out as a period in which the structural changes manifested themselves. The changes that took place in this period turned out to have had the most influential impact on trade patterns. For empirical trade research this is an important conclusion, as this period should be dealt with carefully and separately.

It is beyond the scope of this article to give a full-fledged analysis of possible causes for the structural breaks that took place. We indicate, admittedly somewhat speculatively, that neither the rise of China and India nor the deregulation programs in many OECD countries in the 1980s are likely to have been the main cause. Instead, the interaction between the real and monetary economy (possibly fuelled by nominal rigidities and delays in exchange rate pass through) as measured by the large swing in the real effective exchange rate of the dollar in the 1980s is a possible candidate. As we pointed out in Section 4.3, a first step for future research in this direction would be to differentiate between price and quantity movements in measures of comparative advantage. In view of similar recent large swings, it is likely that the OECD countries will again go through substantial structural adjustments in the near future.

Notes

1. Also as far as kernel estimates are concerned, one has to make a choice between functional forms of the kernels, like a rectangular kernel, Epanechnikov, biweight, or triangular kernels.
2. In Redding (2002) the industry-year data are divided into quintiles.
3. Extended by Hinloopen, Wagenvoort, and van Marrewijk (2008), see this article for details on the methodology and this extension.
4. It is relatively straightforward to relate this measure to industry output, prices and factors of production using a GDP function approach (approximated by a translog function), see Kohli (1991, ch 6 and 7). Derivatives of the GDP function give output shares of sectors in the economy (including export sectors). Hillman (1980) gives a theoretical derivation for the relation between *revealed* comparative advantage and comparative advantage (now known as the Hillman condition).
5. The number of observations (SITC groups) is not always exactly 235; for some countries, and for some years the number of observations is smaller. This has no consequence for the application of PP-plots, because the number of observations in the distributions that are compared need not be equal.
6. In addition, as a referee pointed out, equation (3) can be decomposed into a price term and a quantity term. This might clarify whether price or quantity changes are the most important for the structural changes we identify. Exchange rate changes, e.g. could very well affect equation (3); see also Section 4.3. Unfortunately, only unit values are available at this level of detail and these are problematic for not adequately accounting for quality differences (see e.g. Silver 2007). Moreover, harmonized unit value data are hard to come by over the full period of this study due to classification differences in these data, see Feenstra et al. (2005).
7. For Denmark and Austria this occurs three times and for Sweden and Switzerland four times.
8. For critical values, see Hinloopen and van Marrewijk (2005). If the number of observations $N = 230$ (slightly below the average of 232 observations), the critical values are: 0.0932 at the 10% level, 0.1086 at the 5% level, 0.1229 at the 2.5% level, and 0.1402 at the 1% level.
9. Part of the discussion in this sub-section is based on van Marrewijk (2007, chs 20 and 23).

10. The first oil shock was in 1973.
11. As the referee pointed out, a first analysis of this explanation for the structural breaks, is to separate price and quantity changes in equation (3). If we allow for the possibility that different countries export different baskets of goods, the export price index of a country can diverge from the export price index for 'world' exports. The movement of the US exchange rate in the 1980s could have caused such a divergence even in the absence of changes in quantities exported. Unfortunately data limitations prevent us from doing so (see also note 6).

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Appendix 1

For each country, we produce 741 HMs. This is a large number. One way of studying the outcomes is to draw contour plots of the HMs. The shading indicates the size of the HMs. Figure A1 shows for all OECD countries these contour plots. Take the first panel that shows HM indices for Australia. In the left bottom corner, the first year of comparison is depicted, 1962. Moving in an upward direction gives the HM value of the comparison between 1962 and 1963, the next number gives the value of the HM index for the comparison of 1962 with 1964, etc. until the final comparison of 1962 with 2000. The next column does the same for 1963, and finally the last column compares 1999 with 2000 (and thus shows only one entry). The shading shows which distributions differ significantly from each other. Given the critical values from footnote 8, we see, e.g. that 1962 is rather special for Australia as 1962 is significantly different from all other distributions of BIs. More revealing is moving one or two columns to the right. This shows that the end of the 1980s and the beginning of the 1990s the distributions of the BIs structurally differs from the 1960s and 1970s.

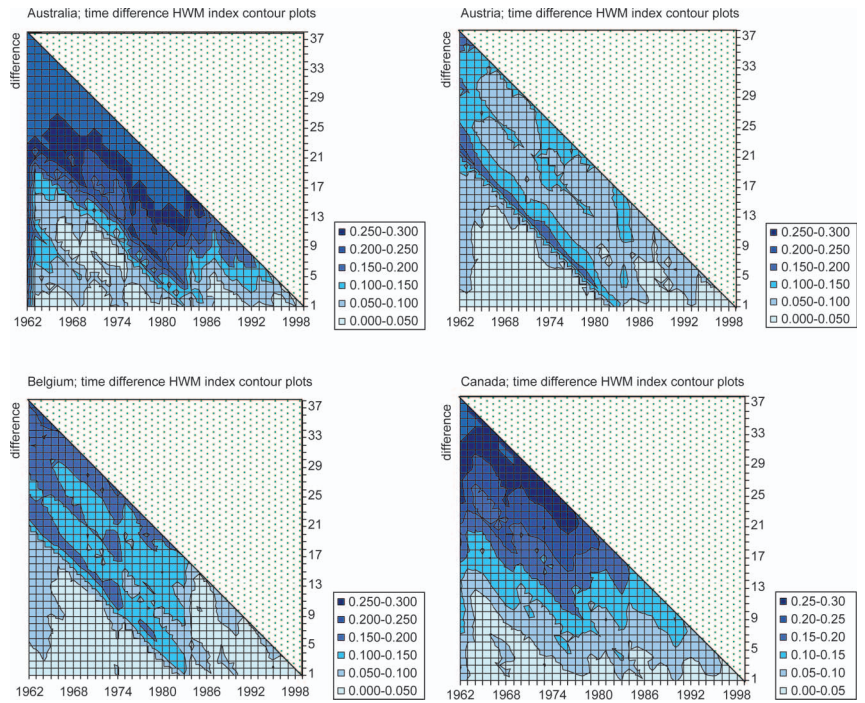


Figure A1. HM indices for OECD countries.

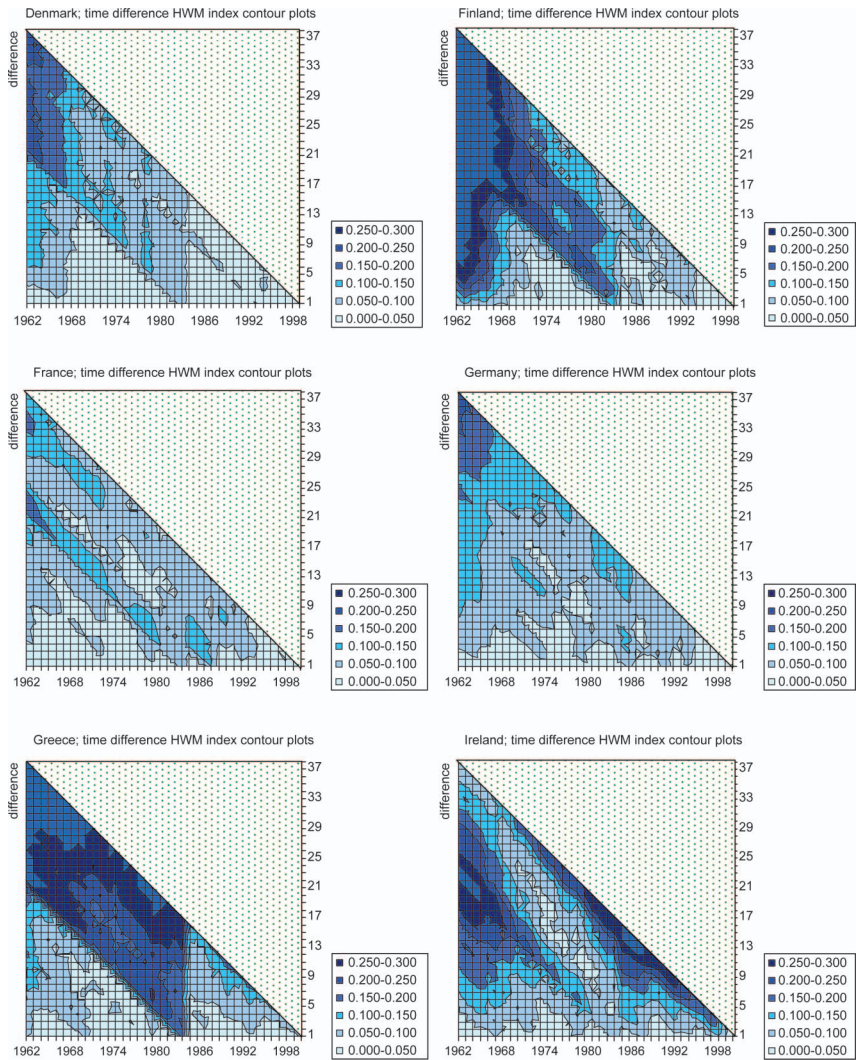


Figure A1. (Continued).

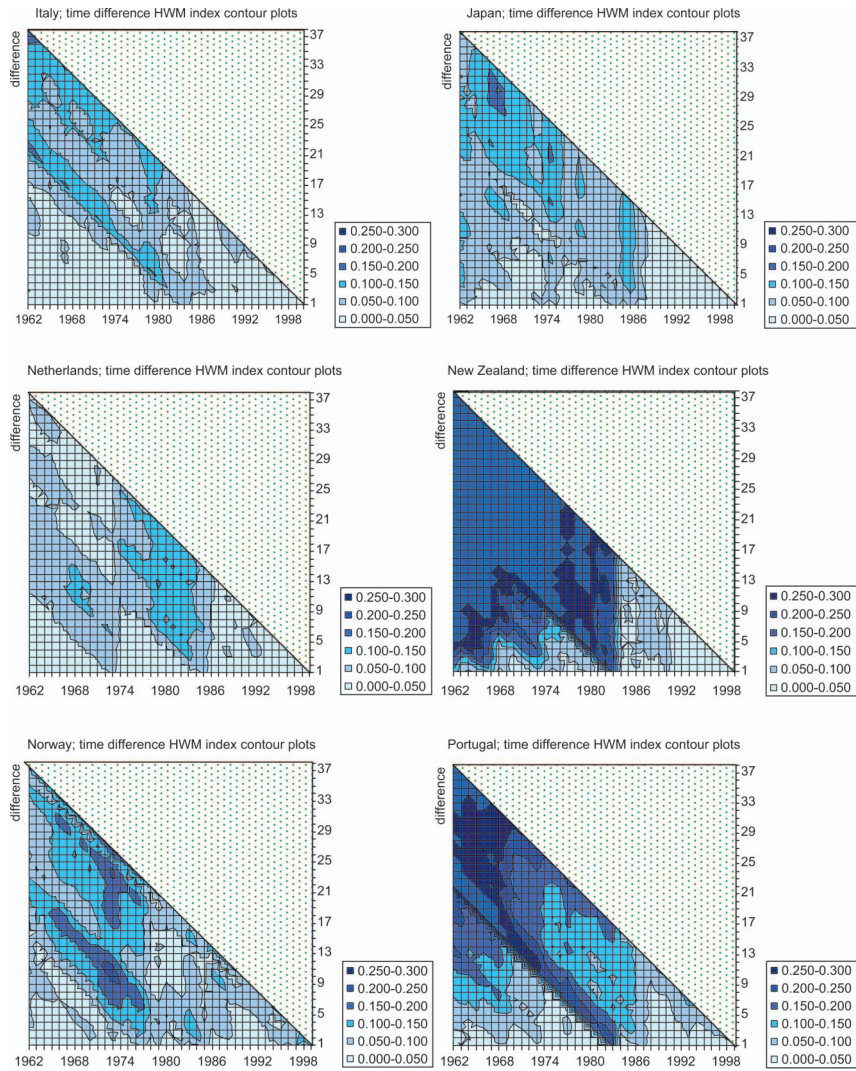


Figure A1. (Continued).

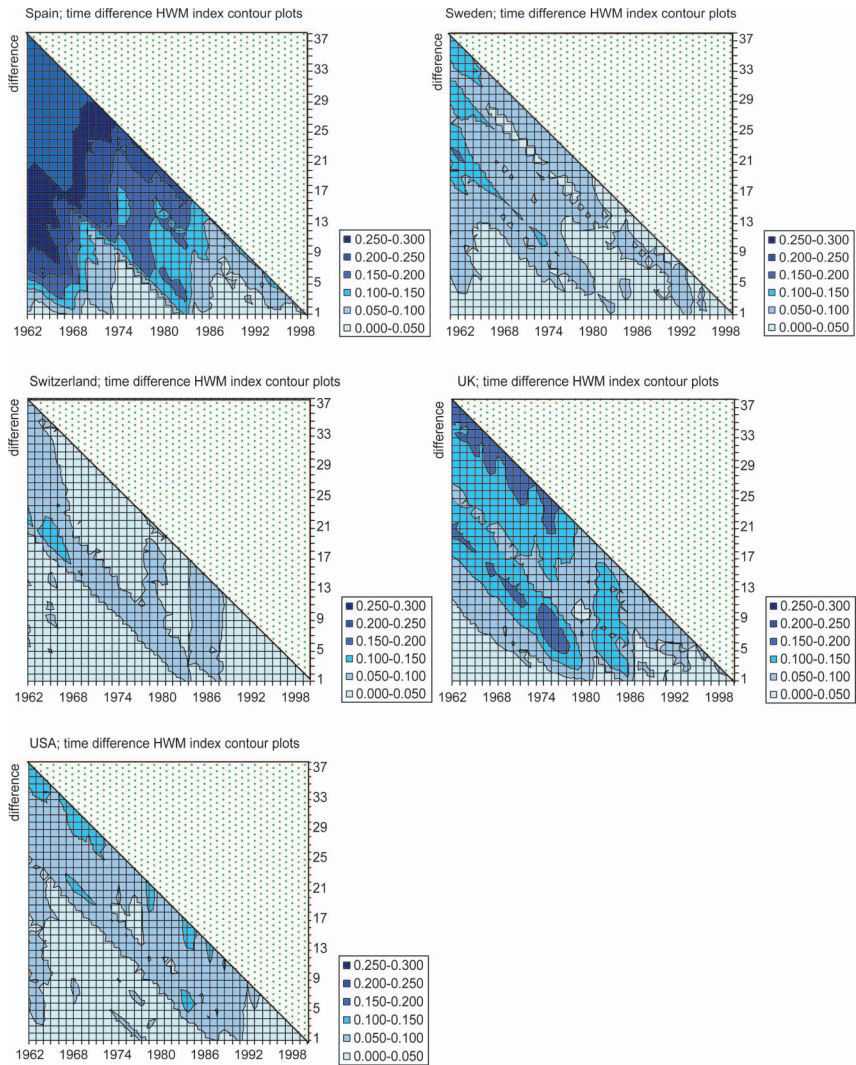


Figure A1. (Continued).

Table A1. Number of OECD countries with structural change at 10% level and up.

Year	Comparison with .. years in the past									
	1	2	3	4	5	6	7	8	9	10
1963	2									
1964	0	3								
1965	0	1	4							
1966	0	1	2	4						
1967	0	2	2	2	5					
1968	1	2	3	3	3	7				
1969	0	2	3	4	4	5	8			
1970	0	1	4	3	4	6	7	11		
1971	0	0	1	4	3	7	7	9	11	
1972	0	0	0	2	4	4	6	7	9	12
1973	0	0	0	0	3	4	4	6	7	9
1974	0	0	2	1	3	6	7	6	7	9
1975	0	1	1	2	2	4	5	5	5	7
1976	0	1	1	1	1	1	5	5	5	6
1977	0	0	1	1	1	1	1	4	5	5
1978	0	1	0	2	2	2	2	1	3	6
1979	0	0	0	1	3	3	3	4	3	6
1980	0	0	2	2	2	3	3	4	6	6
1981	0	0	1	2	4	5	5	3	5	6
1982	0	0	1	2	2	4	6	5	5	5
1983	0	0	1	3	3	3	3	3	3	3
1984	8	11	10	11	12	14	15	14	15	16
1985	0	7	8	8	9	12	14	14	15	14
1986	0	1	10	9	9	9	13	14	11	12
1987	0	2	3	11	10	9	10	12	14	9
1988	1	1	7	8	10	9	8	6	10	9
1989	0	1	3	5	6	10	8	7	7	10
1990	0	0	0	3	8	10	8	8	8	8
1991	0	0	0	1	1	6	7	10	10	9
1992	0	0	0	0	1	1	6	8	10	11
1993	0	0	1	0	0	1	3	5	5	10
1994	0	0	1	0	1	2	1	3	5	7
1995	0	1	1	3	2	3	3	3	4	11
1996	0	0	0	1	3	3	5	5	5	7
1997	0	0	0	0	3	3	3	5	5	5
1998	1	2	1	1	2	3	5	4	4	5
1999	0	1	1	2	3	2	3	4	4	4
2000	1	1	1	3	4	5	6	6	7	8